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NAVY DEPARTMENT

BUMED NEWS LETTER

a digest of timely information

Editor - Captain F. W. Farrar. (MC). U.S.N.

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Immunity in Mumps - The Correlation of the Presence of Complement-Fixing Antibody and Resistance to Mumps in Human Beings: The epidemiologic pattern of mumps suggests that inapparent infection leading to the establishment of permanent immunity is frequent. Thus, only about 60 per cent of the adult population in the United States have experienced a recognizable attack of this disease, whereas about 90 per cent of the same individuals have contracted measles during childhood or adolescence. Since there is no reason to believe that the virus of mumps is less widely disseminated than that of measles, it would seem that one factor which could account, in part at least, for the lower incidence of clinically discernible mumps might be specific immunity induced by subclinical infection. Direct evidence that this sort of infection by the virus of mumps did take place in one individual following exposure in the laboratory was obtained by means of (1) the complement-fixation test and (2) the test for dermal hypersensitivity. The development of methods for the identification of those individuals who have experienced such infections, should such persons prove to be numerous, would clearly be desirable. If in the future a procedure of immunization were to become available, such tests would be essential in its practical application.

Accordingly, studies which are described in this and the following article were undertaken among groups of adults and children in which the two technics mentioned above were employed. The results were also correlated, when possible, with the record in respect to a known attack of mumps and, in certain cases, with the events which followed adequate exposure to the disease. Such correlations not only afford direct evidence in support of the epidemiologic deduction that the incidence of subclinical infection is significantly large, but are helpful in the evaluation of these two tests as indices of susceptibility or resistance.

The results of this study taken as a whole show that the antibody which brings about fixation of complement whenever found in the sera of normal human beings has arisen in response to previous infection with the virus of mumps and not as a product of some unknown process of physiological maturation or through antigenic stimulation by a biologically unrelated but chemically similar agent. Of perhaps equal importance is the demonstration that the mumps antibody may frequently appear not only as a result of clinically apparent disease but also from inapparent or subclinical infection.

In view of these findings, it might, then, be predicted that individuals in whom this antibody is present would prove resistant to exposure since it is common knowledge that an attack of mumps in nearly all cases confers a solid and lasting immunity. Experiment has confirmed this expectation. It should, however, by no means be inferred from this reasoning that the complement-fixing antibody is itself the essential factor in the mechanism of

immunity. On the contrary, there are several indications which strongly suggest that the antibody may be distinct from that upon which resistance depends. The complement-fixing antibody, as far as available knowledge goes, can therefore only be regarded as an index of an immunity in which it may well play no role.

It has been known for some time that strains of certain viruses may occur which are antigenically distinct, for example, influenza A and B or the three strains of the virus of foot-and-mouth disease. Accordingly, the authors have sought to detect any phenomena that would suggest the existence of a similar diversity among strains of mumps virus. So far no indication of antigenic multiplicity has been encountered. In fact, the study of several strains obtained from the Boston area indicated a complete homogeneity. The results of over 3,000 complement-fixation tests reported in this paper on the sera of persons coming from various sections of the United States afford indirect evidence for the essential unity of mumps virus as an antigen. For, were there a variety of distinct strains existing in this country, it would seem highly improbable that with the single strain of virus employed as antigen the incidence of positive reactions observed in the various groups which have been studied would have shown such uniformity.

Regarded from a practical standpoint, the findings described in this paper indicate that the complement-fixation test might be employed to distinguish from the potentially susceptible a large portion (75 to 80 per cent) of the resistant individuals in any group. But in most instances skin testing as described in the following paper would be far more convenient and less expensive. Indeed, except in young children and a small proportion of adults, the skin test, as will be shown, appears to be a somewhat more sensitive indicator of the resistant individual. However, since the correlation between the results obtained by the two methods is not complete, the complement-fixation test might be employed to provide as much information as possible in those cases for which the greatest accuracy is sought.

Of 163 persons giving positive complement-fixation tests who were exposed to mumps, one afterwards developed the disease; of 285 negative reactors similarly exposed, 56 afterwards had mumps.

Of 78 individuals whose tests were originally negative, and who failed to develop mumps when subjected to intimate exposure to it, 41 per cent gave positive reactions when tested one month later.

Seventy-seven per cent of complement-fixation tests made on the sera of 565 normal adults who admitted a previous attack of mumps were positive. A similar correlation was recorded in tests on the sera of a small group of

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children with positive histories. Of 356 medical students admitting previous attacks, 80 per cent gave positive tests. Of 386 normal adults who denied previous attacks, 42 per cent gave positive tests; of 85 children with negative histories, 38 per cent reacted positively.

In groups in which exceptionally intense exposure was not known to have occurred in the past, the proportions of positive reactors were: adults, 61 per cent; children, 49 per cent. In contrast to these normal persons, the incidence of positive reactors among permanently institutionalized mental defectives was 38 per cent of 356 adults, and 32 per cent of 475 children.

In only 2 per cent of 320 normal adults and children did the titer of complement-fixing antibody reach 1-192. In no instance in which the endpoint was determined was a higher titer recorded.

The results of complement-fixation tests on the sera of mother and newborn infant were essentially the same in five instances.

Conclusions: 1. With very rare exceptions, individuals giving positive complement-fixation tests for mumps are resistant to infection by natural exposure.

2. Inapparent infections with the virus of mumps occur and, on the basis of the serologic evidence, may represent on the average about one-third of all infections.

3. The presence in the blood of complement-fixing antibody capable of reacting with antigen containing the virus of mumps is indicative of previous infection with this virus.

4. Titers of complement-fixing antibody exceeding 1-192 are very rarely found in the sera of normal individuals. Titers higher than this can, therefore, be regarded as presumptive evidence of recent infection.

5. Transplacental passage of complement-fixing antibody for the virus of mumps probably occurs. (J. Exper. Med., Oct. 1, '46 - Maris et al.)

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Immunity in Mumps - The Correlation of the Presence of Dermal Hypersensitivity and Resistance to Mumps: It has been demonstrated previously that following attacks of mumps a state of specific hypersensitivity to material containing the virus may become established after varying periods of time.

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Such hypersensitivity is revealed by the mild, local inflammatory response which follows within 24 to 48 hours the intradermal inoculation of the antigen. In preliminary reports it has also been pointed out that most persons who were able to give a reliable history of an attack of mumps, when tested, showed this delayed type of skin reaction. On the other hand, only about one-half of those who gave a history of no previous attack failed to react. Taken together, these observations suggested that inapparent infections might frequently occur and that a positive skin reaction might be interpreted as indicative of immunity when considered in relation to the fact that known infection with the virus usually confers resistance which is enduring and effective.

Since the publication of the preliminary reports, additional data have been obtained which, together with the older observations, have been critically analyzed. In general, the earlier findings have been corroborated, and the significance of the reaction and its limitation as an index of immunity have been defined more precisely.

In the study most of the skin tests were carried out with a saline suspension of parotid gland obtained from monkeys infected via Stensen's duct with monkey-adapted virus. The suspension was heated at 65° C. for 20 minutes and preserved with 0.5 per cent phenol. The details of the preparation and standardization of this material as well as those concerning the preparation of the normal monkey parotid tissue employed as control have been presented previously.

Of 89 persons tested before the onset of mumps, 89 per cent exhibited erythematous reactions 10 mm. or less in diameter, and 95 per cent, reactions 15 mm. or less in diameter.

Of 40 persons tested during the first 5 days of mumps, 95 per cent exhibited reactions 10 mm. or less, and 98 per cent, reactions 15 mm. or less.

Of 480 exposed persons, the attack rate of mumps was 46 per cent among 340 with reactions 10 mm. or less, and 10 per cent among 240 with reactions greater than 10 mm. The attack rate was only 2 per cent among 161 with reactions exceeding 15 mm.

The attack rates in 13 skin-tested groups which were exposed to mumps tended to be inversely proportional to the incidence of reactions exceeding 10 mm.

The incidence of reactions exceeding 10 mm. was approximately twice as high among 529 adults (persons 18 years or older) as it was among 306 children (persons under 18 years).

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Of 179 adults giving positive histories of mumps, 82 per cent exhibited skin reactions exceeding 10 mm. In certain groups the correlation between history and positive skin test was as high as 0.9. Of 132 adults giving negative histories, 58 per cent exhibited skin reactions exceeding 10 mm. The proportion of reactions exceeding 10 mm. in a small number of children giving positive histories was 75 per cent.

Of 167 adults with positive complement-fixation tests, 87 per cent exhibited skin reactions exceeding 10 mm. Of 111 adults with negative complement-fixation tests, 52 per cent exhibited reactions exceeding 10 mm. Of 43 children with positive complement-fixation tests, the skin test reactions exceeded 10 mm. in 70 per cent. The skin reactions exceeded 10 mm. in 29 per cent of 105 children with negative complement-fixation tests.

In 69 of 72 individuals in whom skin reactions exceeded 10 mm., complement-fixing antibody either appeared in the blood or increased in amount within about 2 weeks after the tests were done. Such antibody responses likewise were observed in 34 of 76 individuals in whom skin reactions were 10 mm. or less. The data summarized up to this point were obtained with virus derived from the infected parotid gland of monkeys.

The results of simultaneous tests in 82 individuals employing materials prepared from infected monkey parotid gland and amniotic membrane of chick embryos infected with mumps virus indicated in general that the same individual responded in a similar manner to both antigens. In many instances, however, the membrane material produced weaker reactions. Occasionally an individual failed to react to one of these materials but did respond to the other.

On the basis of these findings, the following conclusions have been drawn:

1. Persons exhibiting erythematous dermal reactions exceeding 10 mm. in mean diameter 48 hours after inoculation with a suspension of heated, inactivated mumps virus obtained from the parotid gland of infected rhesus monkeys may be regarded from the practical standpoint as resistant to mumps. According to this criterion, an error in interpretation of about 10 per cent may be made. This error will be reduced to approximately 2 per cent if a reaction larger than 15 mm. be taken as the criterion for the resistant state.

2. Preliminary tests employing skin test material prepared from the amniotic membranes of infected chick embryos show that it also exhibits the capacity to induce local reactions in persons hypersensitive to the virus of mumps or its products.

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3. In general, the attack rate of mumps in exposed groups will be low when the incidence of positive skin reactors exceeds 50 per cent. The skin test might, therefore, be employed to obtain an estimate of impending morbidity in family groups or units of institutionalized or military personnel.

4. By means of the skin test, additional evidence has been obtained which indicates that subclinical attacks by the virus of mumps are frequent, accounting in young adults for about 33 per cent of past infections.

5. The skin test in adults is in most instances a more sensitive indicator of past infection and hence of immunity than is the complement-fixation test.

6. The skin-test material is antigenic, giving rise to the formation or increase of specific complement-fixing antibody.

7. It is possible, though not demonstrated, that skin testing may lead to increased resistance to infection by the virus.

8. From a comparison of certain general epidemiologic features of mumps with those of other diseases in which the phenomenon of "population immunity" is already established, the findings reported here are in accord with epidemiologic expectancy. (J. Exper. Med., Oct. 1, '46 - Enders et al.)

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On Comparative Results Obtained with Crystalline Penicillins F, G, K, and X When Exposed in the Warburg Apparatus to the Action of Liver and Other Mammalian Tissues, Blood and Blood Fractions, and Bacteria: Eagle et al. and Coghill et al. have reported that when equal amounts of F, G, K, and X penicillins in Oxford Units are injected in man and other mammals, the concentration of K in the blood in any given time is substantially lower than that of F, G, and X, and that K disappears from the blood far more rapidly than F, G, and X. Coghill et al. also noted that over two-thirds of the F, G, and X and less than one-third of the K injected was recoverable in the urine. It has been concluded from these experiments that K, undergoes decomposition in the body much more rapidly than F, G, and X, and that this may account for its relatively low therapeutic value.

The purpose of this investigation was to determine whether the differences observed may not be due, at least partially, to differences in the distribution coefficients of K as compared with F, G, and X between tissue and tissue components, not only of liver, muscle, etc., but also of blood and the residual aqueous solution in various body fluids. From the structure of its terminal group

it might reasonably be expected that penicillin K would be removed from the water phase by certain components of the cell more readily than penicillins F, G, and X. The results obtained on fractional columns and the lipo-water distribution experiments of Craig also lend support to this point of view.

The difficulty experienced in securing large amounts of crystalline penicillins F, G, K, and X and of the new penicillins prepared by introducing appropriate precursors or adjuvants in the fermentation processes, and the tremendous expenditure of animals and of the time of scientific personnel in carrying out experiments made it desirable to devise some means of studying in vitro the action of mammalian tissues and tissue products and enzymes on various penicillins. Similar studies regarding the effects exerted by various micro-organisms and their enzymes and products on various penicillins in vitro were also desirable. Such tests can be carried out in a very crude manner and to a very limited extent in an ordinary incubator, but if it is desired to maintain respiration and other physical conditions as nearly normal as possible, it is preferable to carry out such experiments in the Warburg apparatus which makes it possible to carry out easily an extensive series of experiments with total amounts of not more than 1 mg. of a given crystalline penicillin as compared with the larger amounts of from 1 to 5 or 10 Gm. required for elaborate animal experiments.

From the results of over fifty experiments conducted in the Warburg apparatus, with a total of at least seven hundred individual tests, it may be stated that although the results have been at times distinctly erratic, liver and other tissues when used under strictly comparable conditions have without exception caused the removal, blocking or destruction of penicillin K to a far greater extent than penicillin G. Penicillins F and X have fallen into the same general category as G. Homogenized liver, blood, and blood fractions have shown similar differentiations between K and G, in certain cases running substantially higher than with simple liver tissues. In a preliminary experiment Staph. aureus and B. subtilis have also shown a similar differential effect. Preliminary heating of tissues and tissue products to a point calculated to denature proteins and destroy enzymes tended to reduce the individual percentage inactivation of both K and G, but did not materially change the ratios of K and G removed as compared with unheated materials.

By using this method it has been possible to distinguish commercial lots consisting in great part of penicillin G from those containing large proportions of penicillin K and to make a preliminary survey of certain new penicillins made by introducing appropriate precursors into the fermentation process.

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The results reported in this preliminary article may represent the relative extent of hydrolysis or destruction of K as compared with G in the experiments in question. However, until further experiments have been conducted in such a manner as to leave no doubt that the amounts of penicillins K and G which have been removed from the aqueous phase have been entirely destroyed, the authors prefer to continue to speak of the percentage which has disappeared as having been removed from the scene of action.

This article constitutes an interim report to the Antibiotics Study Section of the National Research Council. The authors feel that the experimental work in question should be repeated and extended before drawing any final conclusions. (Sept. '46 - Clowes and Keltch)

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Cellular Changes Produced by Extracts of Human Organs: A study was made on cellular infiltrations found in the organs of guinea pigs that were injected subcutaneously with extracts made from organs obtained from patients dead of leukemia, Hodgkin's disease, and other diseases.

The various organs were extracted by methods based on those of Turner and Miller who have produced cellular changes in the organs of guinea pigs by injecting extracts of the urine and feces of patients with leukemia. They have described three types of cellular reactions produced by these extracts and designated these changes as myeloid, lymphoid, and Hodgkin's types. These changes are produced by a keto-acid and a hydroxy-acid present in the extracts, and by mixtures of these two substances, respectively.

In the present study, following the injection of lipoid extracts of organs (liver, spleen, and lymph nodes) from 5 patients with leukemia, 1 with Hodgkin's disease, and 4 "control" cases (3 of heart disease and 1 of cerebral tumor) into 28 guinea pigs, it was observed that:

a. extracts from human myeloid leukemic organs produced "myeloid reactions" or infiltrations in guinea pigs;

b. extracts from lymphoid leukemic organs produced "lymphoid reactions";

c. extracts from organs involved with Hodgkin's disease produced "Hodgkin's reactions"; and

d. extracts from "normal" organs produced slight lymphoid or monocytoid infiltrations.

(Blood, J. Hematol., Sept. '46 - Erf et al

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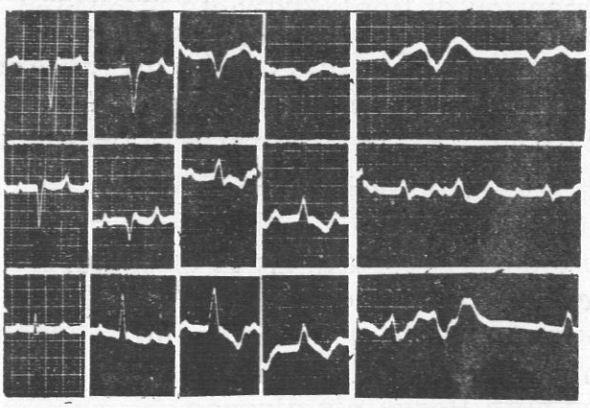
Cardiac Failure in Cattle on Vitamin E-free Rations as Revealed by Electrocardiograms: During the past 8 or 10 years, in connection with an extensive study designed to determine the role of vitamin E in the nutrition and reproduction of cattle, a considerable number of the animals fed vitamin E-free rations throughout their entire lives have died suddenly and without evident cause as revealed by gross findings at necropsy. The deaths have occurred among animals of both sexes and at ages ranging from 18 months to 5 years. The manner and suddenness of the deaths strongly suggested that the heart was involved. A variety of effects of vitamin E deficiency have been reported in different species of animals, muscular dystrophy in some form being the most common. Recently Houchin and Smith produced muscular dystrophy in vitamin E-deficient New Zealand white rabbits 5 weeks of age. They found such animals to be highly susceptible to the action of the posterior pituitary extract since they were killed by much smaller doses than were easily tolerated by controls receiving a-tocopherol. The dystrophic rabbits were, however, more resistant to normally lethal doses of cardiac glucosides. Radiographic examinations of the thorax showed the probable existence of cardiac dilatation. Houchin and Smith concluded that the sudden death which occurs in advanced cases of muscular dystrophy is due directly to cardiac failure.

Beginning on 2 November 1945 and at monthly intervals or oftener thereafter, electrocardiograms were obtained on all animals included in the experiment.

The following selected recordings show the progressive changes that occurred in the cardiac cycle of E541.



11-2-45 12-21-45 3-19-46 3-26-46 4-1-46

This heifer is the only animal that has died since the electrocardiographic recordings were started. Her dam and sire both were raised on vitamin E-free rations and died suddenly in the same manner as their daughter. The first definite changes appear in the recordings of 21 December 1945, as shown by an increase in P-R interval, a condition which persisted throughout the remaining records. The QRS complexes in Leads II and III also were changed, the potential in Lead II was reduced, and the QRS in Lead III changed from an RS type to an R type, an indication of axis deviation. A clearly apparent increase in the QRS interval

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appeared in the record of 19 March 1946. The QRS in Lead II also changed from an RS type to an R type. In the record of 26 March 1946 the potential of the various deflections has decreased and remains so in the subsequent recordings.

In general, the electrocardiograms obtained on this animal appear to show a decreased functional activity of the myocardium in the terminal stages of the deficiency, as indicated by the decrease in the potential of the deflection of the QRS complex and by the increase in duration of the P-R, QRS, and Q-T intervals. The extrasystoles which are apparent in the last record indicate dissociation of atrial and ventricular impulses and possibly damage to the conducting tissue.

Although the microscopic examinations of heart sections of this and other animals in the study have not been completed, definite abnormalities have been noted. Atrophy and scarring of the cardiac muscle fibers are clearly indicated. (Science, Oct. 4, '46 - Gullickson and Calverley)

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Crash Helmets: The segregation of the British Army's head-injury cases in special centers made possible the prompt recognition of the importance of crash helmets.

In 1940, it was observed that a large proportion of the patients under treatment were motorcyclists. Of the first 290 patients with blunt-object head injury seen by the author at the Army Unit in Oxford, England, 70 were motorcyclists. Of these 70 patients, 1 died, 10 were invalided from the Service, and the remaining 59 were absent from duty for an average period of 4 months each. In the first 21 months of the war 2,279 motorcyclists and pillion passengers were killed on the road (over 3 a day), and calculations showed that to this death roll the Army was contributing about two-thirds. Head injury was present in 92 per cent of a series of 111 of these fatal cases, and, although not the sole cause of death, it was clearly a major factor in the majority.

In 1940 the Army issued crash helmets only to certain types of motorcyclists. Some motorcyclists wore the ordinary steel helmet. In 1940-1941 only one in 20 of the motorcyclist patients at Oxford had been wearing a crash helmet at the time of the accident, but in these the relative mildness of symptoms was impressive.

After recommendations had been made and action taken, by the end of 1942 enough evidence had been accumulated to prove that crash helmets were very effective and to show how they might be further improved.

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Structure and Mode of Action of the Crash Helmet: The components of a crash helmet are a firm outer shell, and an inner sling and hatband which act as buffers. To understand the action of crash helmets it is necessary to consider what happens in a blunt-object head injury. There are two important effects of the blow, namely, (1) local injury beneath the site of the blow, and (2) distortions in parts of the brain remote from the blow which depend on sudden change of velocity of the head.

At the site of the blow the scalp may or may not be torn, the skull is bent and may break, and fragments of it may penetrate the brain which may be bruised as well as torn. According to Holbourn, when the head is made to rotate suddenly by a blow from a moving object, or against a stationary one, the brain, not being a rigid structure, lags behind. The brain makes the only kind of movement possible to a highly incompressible substance in an enclosed space, namely, a swirling movement, and its surface slides along inside the cranial cavity. These sliding movements of the surface of the brain have been observed with a high-speed camera and a perspex window in the skull, using the technic of Shelden et al. The movements set up shearing stresses in various parts of the brain; they are most severe where the lesser wing of the sphenoid juts into the cranial cavity, and it is in this region that bruising and laceration of the brain are so often seen no matter where the blow has been struck. The clinical state of concussion is clearly due to remote effects since it does not arise from the local brain injury of many gunshot wounds or of surgical operations.

The crash helmet modifies both the local and the remote effects. Locally, the shell of the helmet spreads the blow over a wide area and protects the scalp and skull from the pointed projections of whatever is struck. In some cases it prevents fracture of the skull; in others, where a fracture is produced, it prevents the fracture from becoming depressed. The shell lessens bending of the skull, and therefore the local bruising of the brain. The shell also lengthens the blow (spreads it over a longer period of time). It does this by (1) sliding over the surface struck (instead of stopping more abruptly as the unprotected head would do owing to its greater coefficient of friction), and by (2) the buffering action of the sling and hatband. The blow is also lengthened to some extent by a rotating action of the helmet.

Observations on Head Wounds: In the course of this work it was found possible to determine the site of the blow on the head from the marks on the helmet because they corresponded so closely. In 91 cases over 50 per cent of the blows were on the front half of the helmet and very few were on the crown. In 40 per cent the head received more than one blow. Blows in the occipital region, which is protected by the helmet and by the neck muscles,

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were least dangerous to life; and blows in the temporal region, which is not very well protected by the helmet, were most dangerous to life.

The author points out that crash helmets may be used advantageously for many activities other than motorcycle riding.

Conclusions: The present crash helmets could be considerably improved. During the war much time was wasted by the search for suitable buffering substances in place of rubber. Even when a material was in stock, it could not be obtained because it was needed for other purposes more important in the war effort. Now that the war is over a much more efficient helmet could be manufactured at small cost. (Brit. M. J., Sept. 7, '46 - Cairns)

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Section of the Vagus Nerves to the Stomach in the Treatment of Peptic Ulcer: Many physicians have called attention to (1) the high incidence of ulcers in individuals whose occupations subject them to continuous mental strain, and to (2) the tendency for exacerbations of symptoms and signs to occur during periods of emotional stress. Direct evidence implicating the central nervous system was supplied by Cushing, who reported a greater occurrence of acute perforating ulcers of the stomach and duodenum in patients recovering from certain operations on the brain than mere coincidence could allow. These findings have been confirmed by others and indicate a definite hazard in neurologic surgery.

How can disturbances in the brain affect the stomach and produce a progressive perforating ulcer? Although the gastrointestinal tract possesses a true local automatism, its tonus, motility, blood supply, and secretory activity are greatly modified by efferent impulses in the vagi and sympathetics. To a certain limited extent, these nerves exert antagonistic effects and the end-result represents a balance of opposing mechanisms. Excessive activity through the sympathetic fibers might, on theoretical grounds, lead to spasm of the cardia, atony of the stomach, spasm of the pylorus, and decrease in the tonus and motility of the intestines. No changes in the secretion of gastric juice would be expected, but generalized or local vasoconstriction might result. The idea that peptic ulcer is due to local anemia of an area of the gastric mucosa as a result of embolism or vasospasm receives continued consideration. Cushing suggested that the ulcers observed by him might have had such an origin. In recent years an attempt has been made in France to treat peptic ulcer by dividing the splanchnic nerves and excising the first two lumbar sympathetic ganglia. Relief of the ulcer distress was reported, but the operation seems now to have been abandoned. The relief obtained could, of course, be

due to interruption of sensory fibers conveying sensations of pain from the stomach. No convincing evidence has been presented that an excessive or abnormal activity of the sympathetic nervous system exists in ulcer patients, and the experimental evidence is for the most part against this point of view.

Excessive activity through the vagus efferent fibers might be expected to cause a relaxation of the cardia and pylorus, an increase in the motility and tonic constriction of the stomach, and an increase in the secretion of gastric juice. Gastric hypermotility in most ulcer patients has long been recognized, and recently accumulated evidence indicates that an excessive continuous secretion of gastric juice occurs in the empty stomach in the absence of the usual stimulus of food. Both the hypermotility and hypersecretion are abolished by complete section of the vagus nerves to the stomach indicating that both of these abnormal states are neurogenic in origin. The characteristic ulcer distress is also relieved; and that this relief is not caused by interruption of sensory fibers is indicated by the fact that the distress can be produced again by the instillation of a solution of hydrochloric acid into the stomach. Gastroscopic and roentgenographic evidence of the healing after vagus section of large ulcer craters in the stomach, duodenum, and particularly in gastrojejunal stomas provides convincing argument that this procedure corrects those factors that maintain chronicity and progression in these lesions. Since both motility and secretion are reduced, it is not possible to decide from this evidence alone which is the more important in the pathogenesis of the disease. It is in this connection that the data from the experimental laboratory are of decisive importance, and the answer is clear. Pure undiluted gastric juice can digest away the normal mucosa of the stomach, duodenum, or jejunum and produce a typical progressive ulcer. Under normal conditions the gastric juice is diluted and buffered by food and the alkaline duodenal secretions. When an excessive secretion of gastric juice occurs in the empty stomach, the buffering effect of food is absent, and the neutralizing capacity of the duodenal secretions is overcome. The gastric content then approaches pure gastric juice in free acidity and pepsin concentration, and that area of the gastric or duodenal mucosa which is most exposed or least resistant first succumbs. An ulcer forms, progresses, and persists as long as exposure to relatively pure gastric juice continues. Therapy, accordingly, should be directed toward reducing the volume and acidity of the night secretion.

The finding that the excessive continuous secretion in the fasting stomach of ulcer patients is neurogenic in origin constitutes the physiological basis for vagus section as a method of treatment. Up to now, 90 patients have been operated upon by this method in the author's clinic. Keith Grimson at Duke University, Francis Moore in Boston, and Dixon and Clagett at the Mayo Clinic

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have also reported similar series. So far, there appears to be general agreement concerning the immediate and long continued relief of ulcer distress. For the most part, the period of observation has been too short to permit a final evaluation of the method, and the question of ultimate regeneration of the divided vagi remains undecided. The first 12 patients operated upon on the writer's service a little over three years ago are still well, take no medication, and are under no dietary restrictions. The night secretion of gastric juice is still within the normal range, and tests of gastric secretion by the sham meal and insulin hypoglycemia show that regeneration of secretory fibers in the vagi has not yet occurred.

These findings provide strong support to the concept of peptic ulcer as a psychosomatic disease, this term being used merely to indicate that emotions and mental activity of certain types play a dominant role in the pathogenesis. The central nervous system disturbance causes ulcers by producing a hyperactivity in the secretory and motor fibers in the vagus nerves. Although the severing of these nerves prevents nervous tensions of various kinds from affecting the stomach, it cannot be considered the final solution of the ulcer problem. Perhaps this may lie in adjusting the individual to his work and environment so that these tensions do not arise. The possibilities of psychotherapy in the management of peptic ulcer should be re-explored, and the volume and acidity of the continuous night secretion of gastric juice should be used as an objective quantitative measure of the effect of the treatment. (Editorial, Surg., Gynec. and Obst., Oct. '46 - Dragstedt)

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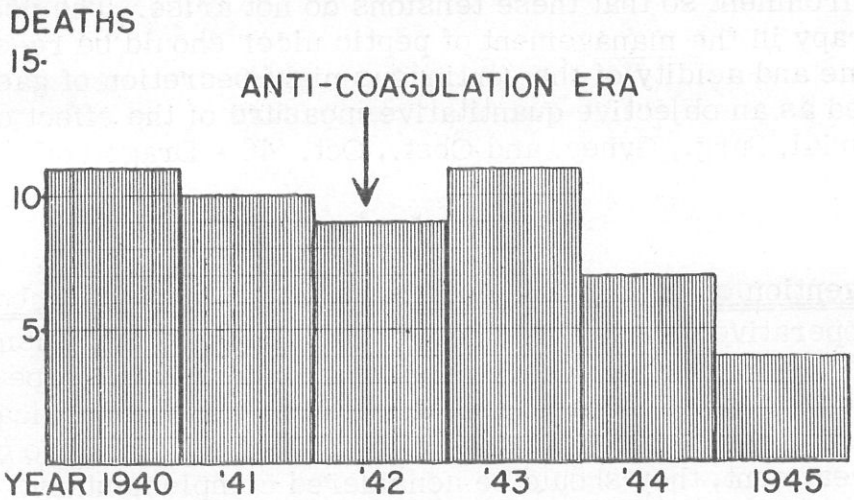
The Prevention of Death from Postoperative Pulmonary Embolism: The study of postoperative venous thrombosis and pulmonary embolism received great impetus six years ago from the almost simultaneous therapeutic application of the anticoagulants, heparin and dicoumarol, and the surgical method of venous ligation and section. Instead of being thought of as two competitive methods of treatment, they should be considered complementary. Slowly, during the past four years, distinct indications for both forms of treatment have clearly evolved. The Lahey Clinic doctors now employ anticoagulation treatment using heparin/Pitkin menstruum and dicoumarol in the majority of cases of postoperative venous thrombosis whether or not benign pulmonary embolism has already occurred. Venous ligation is reserved for the patient who may soon have to have a second-stage operation, such a patient receiving dicoumarol prophylactically beginning two or three days after the second operation. Instead of resorting to ligation, the authors give the rare dicoumarol-resistant patient repeated injections of heparin/Pitkin every two days to keep up an anticoagulant effect. Section and ligation are still employed (1) in ambulatory patients with recurrent deep venous thrombosis and a history of benign

pulmonary embolism, (2) in patients with hemorrhagic colitis with deep venous thrombosis, and (3) in patients with other hemorrhagic tendencies. Heparin/ Pitkin may be used instead of dicoumarol when liver function is poor. In the Lahey Clinic, kidney disease has not been found a contraindication to the use of dicoumarol.

These methods have reduced the deaths in the Clinic to 3 in 170 patients treated by anticoagulants in the last four years. In two of these deaths, the patients were inadequately treated. The third death was as much due to a hopelessly septic peritonitis as to a septic pulmonary infarct with empyema. One of the inadequately treated patients also had bilateral venous ligation which failed to save him from further fatal pulmonary embolism.

This seemingly hopeful outlook at present in the prevention of the dread postoperative complication of thrombosis-embolism has naturally led to more alertness for the signs of this disease. The success achieved is reflected by the falling mortality rate from pulmonary embolism during the past six years. The figure portrays the decrease in the number of deaths. In 1940 and 1941



(era before anticoagulant therapy, venous ligation occasionally done) there were 11 and 10 deaths, respectively; in 1942 (anticoagulation therapy introduced) there were 9 deaths; in 1943, 11 deaths; in 1944 (staff becoming more and more "thrombosis-embolism conscious"), 7 deaths; and in 1945, 4 deaths.

In the study of the 52 deaths from pulmonary embolism in the past six years, it is revealed that 50 of these patients never received any treatment

after signs or symptoms of venous thrombosis or pulmonary embolism had appeared. In the first two years no radical treatment other than a few ligations was attempted. In the last four years, these patients were not treated either, because death was sudden (within one hour) or thrombosis-embolism went unrecognized. Careful review of these cases showed that plenty of warning signs had been apparent even in those cases in which sudden death occurred.

In the six-year period, of the 52 fatalities, there were 22 sudden deaths, 20 deaths within from two to twenty-four hours, and 10 deaths within from one to twenty-four days.

Of the 22 who died suddenly, there were 16 in whom there had been warning signs, namely, (1) a previous history of venous thrombosis, (2) the presence of varicose veins, and (3) unexplained postoperative fever and tachycardia which are most important of all. None of 8 of this group whose history shows that their legs were examined had warning leg pain or Homan's sign.

Of the twenty patients who died in from two to twenty-four hours after the first sign of the fatal pulmonary embolism, 18 gave warning of some sort, as mentioned in the preceding paragraph. Three of them had positive leg signs, and in 6 cases, the legs were not examined or no mention was made of such examination.

Of the 10 patients who died of fatal embolism in from one to twenty-four days after a benign warning pulmonary embolism, all had warning signs: the benign embolism itself plus, in 2, a previous history of vein difficulties, in 2, positive leg signs, and in 6, unexplained fever.

In 84.6 per cent of the 52 patients who died from pulmonary embolism some preventive measure was indicated by premonitory signs in the form of elevated temperature and/or tachycardia occurring a sufficient time before the fatal embolism to allow some attempt at therapy to be made. It is only fair to state that 21 of the deaths occurred before a program for adequate treatment had been instituted.

These 52 fatal cases are being carefully studied and deductions drawn as to methods to be adopted to decrease sudden deaths from pulmonary embolism or deaths in unrecognized cases of pulmonary embolism. A larger report of these studies than contained here will be published. The Clinic physicians believe that prophylactic exercises together with good surgical technic and rapid ambulation have played an important part in the relatively small number of cases (170) of venous thrombosis in which treatment was found necessary among approximately 25,000 major surgical operations during the past four

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years. It is worth while to note, however, that 6 cases of venous thrombosis developed while patients were up and about after operation. (Lahey Clinic Bull., July '46 - Evans and Boller)

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Hyaluronidase Inhibition by Sodium Salicylate in Rheumatic Fever: No clear explanation of the mechanism of sodium salicylate or related drugs in rheumatic fever has been presented. However, it is considered that the arrest of the inflammatory process and the regression of symptoms through their use are not the effect of bacteriostatic action.

The production in mesenchymal tissues of the predominating effects of rheumatic fever and the permeability changes that are known to occur in the evolution of connective tissue point to the interrelationship of several characteristics of rheumatic fever and the spreading factors affecting connective tissue, whether of bacterial or other origin.

In accordance with Bensley, the connective tissue in formation passes through the following stages: edema → gelatinous ground substance → argyrophilic fibers → collagen in the adult stage. In the early stages of the development of connective tissue, diffusibility in the ground substance is favored to the extreme, but in the later stages diffusibility is retarded by the collagenous fibers that characterize adult connective tissue, the previous ground substance having been replaced by the fibers. The importance of the spreading effect of hyaluronidase on connective tissue is based on the observation of Meyer and Palmer who pointed out that the principal substrate of connective tissue and mucoid structures, which compose practically entirely the tissue in the regions affected by rheumatism, is hyaluronic acid.

Durán-Reynals, McClean, Kendall and associates, and especially Crowley have observed that several micro-organisms, including more than 200 strains of hemolytic streptococci, produce or possess hyaluronidase. The hyaluronidase of bacterial origin or from testicular extract, used in the author's work in a 1-per cent dilution, (1) with Evans blue 1-per cent solution for humans, or (2) with India ink 1:2 for rabbits, increases the spread of dyes by means of the enzymatic activity hydrolizing the hyaluronic acid present in the ground substance, decreases the viscosity, and thus favors the passage of liquids, exudates, and pathogenic micro-organisms. The action of hyaluronidase may be divided into the following stages: (a) decreasing acetic acid coagulation of the substrate, (b) decreasing viscosity, and (c) hydrolizing of hyaluronic acid with the release of glucosamine and reducing substance.

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In a total of 96 experiments on 24 albino rabbits it was observed that the area of spread of India ink with hyaluronidase was six times greater than with saline. The oral or intravenous administration of sodium salicylate inhibited the spreading effect of hyaluronidase by from 57 to 66 per cent; the degree of inhibition varied with the dose of salicylate administered. Sulfadiazine did not reduce the activity of hyaluronidase, but appeared to enhance its effect with the development of inflammatory reactions in the center of the areas in several groups. These results were reproduced in a total of 144 experiments on 36 normal male and female adults and children. Intradermal injections in individuals, either with active rheumatic fever or having had it, produce unique reactions with enormous diffusion of the dye and local edema that sometimes involves the arm which was injected with hyaluronidase. The salicylate also inhibits the enzyme in these persons and reduces the hyaluronidase-spreading effect on connective tissue.

The results from studies in normal rabbits and humans, and in individuals who have latent or active rheumatic fever, indicate the important role of hyaluronidase in the rheumatic fever mechanism and the inhibitory effect on the mechanism of sodium salicylate as a typical antirheumatic drug. (Science, June 7, '46 - Francisco Guerra, Instituto Nacional de Cardiologia, Mexico)

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Re Treatment in Neurosyphilis: At a recent meeting in Washington, D. C. of a group of experts on neurosyphilis, consideration was given to a special inquiry concerning the treatment of neurosyphilis. This group of doctors, composed of such men as J. E. Moore, Johns Hopkins University; Harry C. Solomon, Boston Psychopathic Hospital; Bernard Dattner, New York Hospital; Walsh McDermott and Bruce Webster, Cornell University; J. H. Stokes and George Gammon, University of Pennsylvania; Arthur Curtis, University of Michigan, and others, authorized Dr. J. E. Moore to express as the concensus of the group a slight modification of certain pages from his forthcoming monograph "Penicillin in Syphilis" now in press and shortly to be available. The opinions expressed in these pages as modified and which follow as "Suggestions for the Use of Penicillin in Neurosyphilis" are based on the joint experience of the various clinics engaged in the investigation of penicillin in neurosyphilis over the past three years.

It will be noted that in general the recommendation is made that the dosage of 3.6 million units of penicillin given concurrently with malaria may, with the present knowledge, be altered. The concensus now is that tne dosage, whether used alone or concurrently with fever, should be within the general range of from 4 to 10 million units given over a period of from 7-1/2 to 21 days. More definite recommendations for dosage than this cannot be made since information to date does not permit an accurate breakdown of the results obtained related to the total amount of penicillin administered. In general, results appear to have been better with a total of

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more than 4 million units than with less. In certain types of neurosyphilis the results with penicillin therapy alone are so satisfactory that concurrent fever treatment may be omitted unless used in re-treatment for failures.

Concerning the Kettering Hypertherm, it is the concensus that when malaria can be employed instead, it should be given the choice over mechanical fever; and that mechanical fever by any system should be reserved for those patients immune to both tertian and quartan malaria.

SUGGESTIONS FOR THE USE OF PENICILLIN IN NEUROSYPHILIS

It is increasingly clear that in neurosyphilis especially, the physician must weigh carefully the risks incident to treatment against the risks incident to the particular type of neurosyphilis in question. The risks associated with therapy depend in large part on associated syphilitic and/or nonsyphilitic complications, careful evaluation of which is essential in each case.

On the basis of the available evidence, it seems certain that in all types of neurosyphilis:

1. Penicillin therapy is superior to any form of metal chemotherapy.

2. Penicillin therapy is probably as satisfactory as fever therapy plus subsequent metal chemotherapy in various of the less serious types of neurosyphilis. Its status as compared with fever therapy alone or plus metal chemotherapy in the more serious parenchymatous forms (paresis, tabes dorsalis, primary optic atrophy) is not yet settled.

3. Penicillin combined with fever therapy seems superior to penicillin therapy alone in parenchymatous neurosyphilis.

4. Penicillin therapy involves neither (1) risk of death nor (2) risk of seriously incapacitating reactions due to the therapeutic agent itself. Metal chemotherapy involves both risks in proportion to the intensity of the metal chemotherapy, the mortality rate varying from 1 per 200 to 1 per several thousand. Fever therapy through induced malaria carries, in expert hands, a mortality rate of about from 1 to 100 in properly selected cases, higher if careful selection is not exercised. The mortality rate from various forms of mechanical fever varies with the expertness of the physician, but is overall as large or larger than that from malaria.

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5. Penicillin therapy may be completed in from 7-1/2 to 21 days, either in hospitals using an aqueous solution, or on an ambulatory basis using peanut oil and beeswax mixture. An effect from metal chemotherapy comparable with that from penicillin therapy, if obtainable at all, requires months or years of more or less continuous treatment. Fever therapy, whether alone or combined with penicillin, requires from 5 to 8 weeks of hospitalization and an additional two or more weeks of convalescence.

6. As contrasted with other methods for the treatment of neurosyphilis, penicillin therapy is therefore completely safe, less time consuming (because compressed into a short period of time) and thus less expensive, and apparently equally or almost equally effective.

Types of Neurosyphilis Suitable for Treatment with Penicillin Alone: In view of these considerations and the risks incident to the several types of neurosyphilis, the presently available evidence suggests that penicillin alone, in a total dosage of from 4.0 to 10.0 million units over a period of from 7-1/2 to 21 days, should be given as an initial course of treatment to patients with the following types of neurosyphilis:

Asymptomatic (early or late)
Acute syphilitic meningitis
Diffuse meningovascular neurosyphilis
Gumma of the brain or cord (?)
Vascular neurosyphilis (?)

Such a plan is justifiable because the first three of these types of neurosyphilis do not usually carry the risk to the patient of imminent death or complete incapacity, and a plan of treatment which likewise carries no risk is preferable to one that does. In the last two types (gumma and vascular neurosyphilis), penicillin alone is suggested, not only because of the lack of risk from treatment, but also because of the well-demonstrated effect of the drug in resolving inflammatory tissue.

Whether a second course of treatment should be administered, and if so of what type, depends on the presence or absence of clinical relief and on the achievement of an "inactive" spinal fluid as determined by repeated examinations. Until the status of penicillin is still further delineated, recheck neuropsychiatric and blood and spinal-fluid examinations should be carried out every three months during the first post-treatment year, every six months during the second, and yearly thereafter for an indefinite period of time.

If relapse occurs, as evidenced either clinically or by examinations of the spinal fluid, re-treatment must, of course, be given, preferably with the combination of fever and penicillin.

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Types of Neurosyphilis Suitable for Treatment with Penicillin Plus Fever: Certainly until the effect of penicillin alone in neurosyphilis is more definitely evaluated, it is considered best to utilize combined penicillin and fever therapy as initial treatment in the following types of nervous system involvement which carry a serious risk to life or vital bodily function:

General paresis
Taboparesis
Primary optic atrophy
Nerve deafness (in late acquired or congenital syphilis)
Syphilitic (nonparetic) epilepsy
Erb's spinal spastic paraplegia

In the absence of treatment, paresis and taboparesis involve the certainty of insanity and death; optic atrophy, of total blindness; and eighth nerve involvement, of total deafness. These are risks great enough to justify a substantial risk from fever therapy which has been demonstrated certainly to be efficacious in all of the neurosyphilitic syndromes named except Erb's paraplegia. Moreover, it is not yet clear whether penicillin therapy alone is as immediately effective as fever therapy in these syndromes, nor if so, whether the results are as permanent.

The combination of penicillin with fever therapy is theoretically advantageous because of the enhanced treponemicidal effect of penicillin at fever temperatures, practically feasible because of the absence of a therapeutic action of the drug on malaria, and probably superior in results to those obtained from penicillin alone.

The type of fever therapy advised is induced malaria, P. vivax (benign tertian) for white patients, P. malariae (quartan) for Negroes and for those white persons who are immune to P. vivax. Eight to 12 paroxysms (40 - 60 or more hours of fever over 104° F.) are permitted. If the patient is immune to malaria, mechanical fever (hypertherm) may be employed, although malaria is probably superior on the grounds of less discomfort, and (unless the hypertherm is employed by the most expert) lower risk of death, and of a higher incidence and permanence of satisfactory results.

The start of penicillin therapy may be deferred until the first elevation of temperature. The drug is given in total dosage of from 4 to 10 million units, the dose on single injections being so adjusted that the total duration of penicillin therapy will occupy roughly the period of fever from malaria, i.e., from 12 to 20 days. No further treatment with arsenic, bismuth, or penicillin is given, and is almost certainly not necessary. It is probable that as much will

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be accomplished with the course of penicillin-malaria suggested as with malaria plus many months or even years of subsequent metal chemotherapy. If the first course fails to bring about a satisfactory clinical result after an observation period of 6 months, re-treatment with malaria and penicillin or with penicillin alone (larger total dosage?) may be tried.

Post-treatment observation should be carried out as suggested above, i.e., every 3 months for the first year; every 6 months in the second year; and yearly thereafter.

Tabes Dorsalis: A Special Case: The therapeutic problem in tabes is different from that in other types of neurosyphilis. This disease rarely kills, unless indirectly through its urologic complications. It may, however, produce distressing partial or complete invalidism from any one of a number of effects. Because many tabetics are in poor general physical condition and are often of the asthenic habitus anyway, complications due to the syphilis or other infections are frequent. Under these circumstances, it is justifiable in most cases, except in those of taboparesis or primary optic atrophy, to initiate treatment with penicillin alone in the dosage and time advised above. If this course of treatment does not produce marked clinical improvement within 6 months, and if then the patient's physical condition justifies the risk, re-treatment should be given with combined malaria and penicillin.

As with the use of penicillin in syphilis generally, these suggestions for the use of the drug in neurosyphilis are to be regarded as tentative only and subject to prompt revision on the basis of future information.

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Heart Disease and Tuberculosis: Heart disease was the cause of 418,062 deaths in 1944, or 30 per cent of all deaths reported for all ages in the United States. Tuberculosis was reported as the cause of 54,731 deaths, or 4 per cent of all deaths in all age groups. Since 1934, deaths reported as caused by heart disease have increased from 303,724 to 418,062 in 1944 - an increase of 38 per cent over the annual deaths due to heart disease in 1934. In the same period, tuberculosis deaths declined from 71,609 in 1934 to 54,731 in 1944 - a decrease of 24 per cent.

This seems to indicate that heart disease is increasing in significance as a cause of death in the population as a whole, while tuberculosis is declining in significance. This is true for the entire population on the basis of reported deaths, provided that these figures do not lead us into a misconception of the

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relative importance of tuberculosis as a cause of death among certain age groups. A study of data on age specific death rates discloses that, contrary to the impression given when deaths among people of all ages are considered, tuberculosis still stands out as a leading cause of death among the most important age group of the population - persons between 15 and 44 years of age. Here it is noted that tuberculosis was reported as the cause of 26,942 deaths whereas diseases of the heart were reported as the cause of 25,705 deaths out of a total of 185,131. There has been no change in this relationship since 1943.

Any consideration of deaths in the total population may indicate that heart disease should receive the greatest attention. A careful weighing of the facts, however, will lead to an increase and not a decrease in the force of attack on tuberculosis, which kills even more persons than heart disease in this principal productive and reproductive age group. This does not mean that heart disease among persons from 15 to 44 years of age should be neglected. On the contrary, equal emphasis should be given the problem. However, unlike heart disease, tuberculosis can be effectively controlled, and available methods for that control must be utilized to the utmost and at once. The program of case-finding and follow-up should be expanded rapidly. Only in this way will the morbidity and mortality of tuberculosis be reduced. It is particularly important that the disease be eliminated among the people from 15 to 44 years of age. This group constitutes our reservoir of population replenishment and is the source of our most vigorous labor supply. The continuation of a nation's vitality depends upon the health of its people. The known control methods should be no longer neglected. (Editorial, Pub. Health Reps., Oct. 4, '46)

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Abstracts of Reports on Research Projects:

X-189
Rep. No. 10
26 June '46

Field Trial of an Exposure Suit for Shipboard Use.

A suit which will give wind, spray and rain protection to topside personnel and protect men who are immersed during "over-the-side" operations or ship abandonment has been developed for use aboard ships operating in cold waters.

Twenty-five of these suits were tested aboard the USS KNOXVILLE from 7 February to 3 March 1946 during an Air/Sea Rescue and Weather Patrol.

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X-189 (Cont.) At the end of the trial period a questionnaire was filled in by 20 of the subjects.

The exposure suit was preferred because it afforded more protection than available foul-weather and rain clothing. Foul-weather clothing made of jungle cloth wets through, and rain suits tear easily and are not warm enough when worn alone. One-half of the subjects said that the exposure suit would not hinder them in the performance of regular or emergency duties; the others found it to be cumbersome because it was too big and interfered with motion of the arms. The advantages of the suit as listed by three-fourths of the subjects were: better protection from wind and rain, warmth, and the fact that it was a single-unit garment with pockets and a hood. The disadvantages listed by nearly all subjects were: difficulty in donning, and the facts that it tore easily and did not provide adequate warmth for the feet. Suggested improvements in order of frequency were: incorporation of larger bib, pile liner, better material, better boot sizes, felt pads in boots, waterproof zipper, attached gloves and better cuff straps.

The observers agreed that the test suit could replace the rain suit in temperatures below tropical or semitropical levels and that an impermeable protective garment to supplement the foul-weather clothing would be especially desirable in the North Atlantic and North Pacific where there are varying combinations of rain, wind, spray, and cold. During the drills in the water the suit leaked very little and few of the subjects felt cold; the observers thought that it would be satisfactory for "over-the-side" operations.

The suit can be improved by some minor changes. (Nav. Med. Res. Inst., NNMC, Bethesda, Md., Margolis)

(Restricted)

X-533 Rep. No. 4 26 July '46 Minimal Replenishment Air Required for Living Spaces under Conditions of Mechanical Cooling and in Conjunction with the Removal of Odors by Activated Carbon and Other Means.

The odor level in an air-cooled space is dependent upon the following factors: (a) quantity of replenishment air, quantity of air recirculated, and air space available per man;

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X-533 (Cont.)

(b) temperature and humidity of the compartment air; (c) quantity of water condensed on the cooling coils; (d) hygiene of the occupants and cleanliness of the space; and (e) activity of the occupants.

In this study a simulated battleship compartment was utilized and considerable care was exercised to reproduce conditions that are encountered aboard ship. It is felt, therefore, that the results obtained from the experiments provide a reliable indication of weather air requirements in the air conditioning of shipboard berthing spaces.

Three groups of experiments were undertaken, the first to standardize operations, indoctrinate 16 judges in odor perception, develop chemical or physical methods of odor determination, sample air for dust, bacteria and gases, and establish a routine for the subjects. The second group was carried out under conditions of air cooling usually at 78 degrees Effective Temperature (85° dry bulb - 72° F. wet bulb) at approximately 15, 10, 5 and 1 cfm. per man of replenishment air when the outside air was relatively warm and moist. At 53 cfm. per man mechanical ventilation was employed and the average compartment Effective Temperature was 81 degrees (87° F. dry bulb - 76° F. wet bulb). The third group of experiments were designed to study odor control, using activated carbon and other agents to remove substances giving rise to odors, to compare one Effective Temperature with another, and to study the effects of smoking and nonsmoking on the quality of the chamber air.

The following conclusions were reached from the results of this study:

With air cooling alone, 5 cfm. per man (3 cfm. per bunk) of replenishment air will keep odors at acceptable levels. The condensation of water on the cooling coils is associated with the removal of odors. The quality of the air under these conditions is similar to that attained when 53 cfm. per man of replenishment air are introduced by simple ventilation, i.e., without air cooling.

With activated carbon the replenishment air can be further reduced to values as low as 1 cfm. per man (0.66 cfm. per bunk).

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X-533 (Cont.) Tests of the carbon units were made in winter when condensate did not form on the cooling coils.

A liquid chemical "deodorant" ("Airkem") and ozone, employed in separate tests, did not reduce odor levels. Exposure to these substances, however, after a period of ten minutes apparently exerted an anesthetic effect relative to odor perception.

A chemical method based upon the reduction of an acid-potassium permanganate solution by organic matter in the air proved to be of value in determining the amount of tobacco smoke in the environment. The results, however, could not be correlated with amounts of other odoriferous substances present.

Carbon dioxide, carbon monoxide, bacteria, and dust did not reach objectionable or noxious levels even at greatly reduced (1 cfm. per man) replenishment air volumes. (Nav. Med. Res. Inst., NNMC, Bethesda, Md. - Consolazio and Pecora)

(Not Restricted)

X-127 Rep. No. 17 31 July '46 Storage Qualities of Canned Tomato Juice Exposed to Elevated Temperatures.

Canned tomato juice was stored at 160° F, 140° F. and 120° F., and after varying intervals inspected and tasted to determine its acceptability as an emergency life-raft ration and source of fluid.

The juice stored at 160° F. was unfit for consumption after eight days, that stored at 140° F. after 29 days, and that stored at 120° F. showed definite signs of deterioration but could still be considered acceptable for life-raft use after 43 days. (Nav. Med. Res. Inst., NNMC, Bethesda, Md. - Consolazio)

Note: Those interested in seeing copies of the complete reports should address their request to the Research Division, BuMed.

Opinions or conclusions contained in these reports are those of the authors. They are not to be construed as necessarily reflecting

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the views or the endorsement of the Navy Department. Reference may be made to those reports marked "Not Restricted" in the same way as to published articles noting authors, title, source, date, project number, and report number.

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(Not Restricted)

Fellowship in Urology at Tulane University, School of Medicine: The Bureau announces a one-year Fellowship in Urology at Tulane University, New Orleans, La., beginning 1 January 1947. Candidates for this Fellowship should have approximately one year of preliminary experience and training in Urology. Applications must contain an agreement to remain in the Navy for three years after completion of the Fellowship, and should reach BuMed prior to 1 December 1946. Applications may be made by dispatch. (Professional Div., BuMed)

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(Not Restricted)

Public Health Foreign Reports:

Disease	Place	Date	No. of Cases
Cholera	China, Anhwei Prov.	Aug. 1-20, '46	767 (40 fatal)
	Chekiang Prov.	July 21-Aug. 20, '46	692 (80 fatal)
	Fukien Prov., Foochow	Aug. 1-10, '46	133 (24 fatal)
	Honan Prov.	Aug. 1-10, '46	336 (66 fatal)
	Hopeh Prov.	July 21-31, '46	33 (30 fatal)
	Kiangsi Prov.	Aug. 1-10, '46	55 (21 fatal)
	Kiangsu Prov.	July 21-Aug. 31, '46	877 (87 fatal)
	Kwangsi Prov.	Aug. 1-10, '46	83 (31 fatal)
	Kwangtung Prov.	Aug. 1-10, '46	198 (60 fatal)
	Swatow	Aug. 21-31, '46	111 (35 fatal)
	Korea	April or May - about Sept. 1, '46	11,351 (7,399 fatal)
	On Vessel SS LYONS CREEK - from Singapore to Ras Tanura, Arabia	Aug. 29, '46	among crew only (less virulent type)
Plague	Canada, Saskatchewan	(date report) Sept. 14, '46	Found in two pools of fleas from ground squirrels
	China, Fukien Prov.	July 21-Aug. 10, '46	118 (80 fatal)
	Kiangsi Prov.	July 21-Aug. 10, '46	83 (20 fatal)
	Yunnan Prov.	Aug. 21-31, '46	19 (1 fatal)
	Indochina (French)	August '46	44

Public Health Foreign Reports (Cont.):

Disease	Place	Date	No. of Cases
Smallpox (alastrim)	Belgian Congo	Aug. 10-17, '46	885
Typhus Fever	Greece	Sept. 1-7, '46	44
	Indochina (French)	August '46	50
	Italy, Milan Prov.	Aug. 1-20, '46	243
Yellow Fever	Colombia, Santander Department	June 19-July 17, '46	4 (4 fatal)
	Gold Coast, Tamale	Sept. 9, '46	1 (suspected-fatal)
	Peru, San Martin Dept. - Lamas	January '46	1 (fatal)

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ALNAV 556 11 October 1946 (Not Restricted)

Subj: Service Requirements for Dental Officers

1. Refer to Alnavs 281-46 and 379-46. Effective 1 November 1946 the Service requirements for all United States Naval Reserve Dental Officers is reduced from thirty months to twenty-four months. Service requirements are computed from the date of reporting for active duty as dental officers. Paragraph 9.(a)(1) Alnav 384-46 as promulgated in Alnavs 476-46 and 529-46 shall not apply to naval Reserve dental officers. Naval Reserve dental officers shall arrive appropriate activity performing separation function sufficiently in advance so that separation processing will be completed and the terminal leave granted will expire not later than their date of eligibility for release from active duty.

--SecNav. James Forrestal

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Circular Letter 46-149 (Not released in time for this issue.)

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Circular Letter 46-150 (Not released in time for this issue.)

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Circular Letter 46-151 14 October 1946 (Not Restricted)

To: MedOfsCom, NavHosps (Continental)

Subj: Printing Equipment as Authorized for Use in Occupational Therapy Departments in Naval Hospitals.

Ref: (a) Under SecNav ltr of 29 Aug 1945 - Command relationships with respect to Navy Field Printing Plants.

1. Printing equipment authorized for use in Occupational Therapy Departments in naval hospitals is now listed in the Navy Medical Supply Catalog under Class 11. In this listing there are two printing presses included. One is a hand operated press and the other is a foot operated press.

2. It is the intention of this Bureau that printing equipment be installed and used in Occupational Therapy Departments only insofar as it serves as an integral part of the treatment regime of the patient. It is therefore directed that a careful review be made of all printing equipment on hand that is now under cognizance of Occupational Therapy to assure that it is being used for strictly therapeutic purposes. In the future, all purchases of printing equipment for Occupational Therapy uses shall be restricted to the types listed in par. 1 above.

3. Attention is invited to ref (a) which excepts printing equipment being used for occupational therapy in naval hospitals from management control of Commandants of Naval Districts. This privilege should not be abused.

--BuMed. Ross T. McIntire

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Circular Letter 46-152 15 October 1946 (Not Restricted)

To: MedOfsCom, NavHosps, Continental Limits U.S. plus Aiea, T.H., Coco Solo, C. Z., and Guantanamo Bay, Cuba.

Subj: Council on Medical Education and Hospitals Questionnaire - Annual Census of Hospitals and Reports on Internships and Residencies.

This letter from the Chief of BuMed instructs the addressees in the matter of filling out the American Medical Association questionnaire and requests that if the hospital is now or will be actively engaged in the Graduate Training Program, there be submitted along with the completed form the names of consultants, specialty, and the approximate amount of time they are now spending or will later spend each week in connection with the training program.

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Circular Letter 46-153 15 October 1946 (Not Restricted)

To: All Ships and Stations.

Subj: Aviation Classification Tests, Instructions Concerning.

This letter from the Chief of BuMed, which will appear in the 15 October issue of the Navy Department Semimonthly Bulletin, directs (1) that classification tests not bearing certain serial numbers be destroyed and that replacements be requested and (2) that all copies of the Mechanical Comprehension Test (MCT) be checked.

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